

CLAIMS

- 1 1. A system for generating a mosaic image from a plurality of individual images comprising:
- 2 A. a quadrangular region defining module configured to define in one individual image a
- 3 quadrangular region in relation to two points on a vertical anchor in the one individual image
- 4 and mappings of two points on a vertical anchor in at least one other individual image into
- 5 said one individual image;
- 6 B. a warping module configured to warp the quadrangular region to a rectangular region; and
- 7 C. a mosaicing module configured to mosaic the quadrangular region to the mosaic image.
- 2 2. A system as defined in claim 1 in which said two points on said vertical anchor in said one
- 3 individual image comprise points at which the vertical anchor intersects upper and lower borders of
- 4 said one individual image.
- 5 3. A system as defined in claim 1 in which the warping module is configured to smoothly interpolate
- 6 between said quadrangular region and said rectangular region.
- 7 4. A system as defined in claim 1 in which said quadrangular region defining module includes:
- 8 A. a first vertical anchor point identifying module configured to identify two points on the
- 9 vertical anchor in said one individual image;

- 4 B. a second vertical anchor point identifying module configured to identify two points in said
 5 one individual image at which the two points on the vertical anchor in said at least one other
 6 individual image map to said one individual image;
- 7 C. a first line segment determining module configured to determine a line segment between the
 8 two points in said one individual image at which the two points on the vertical anchor in said
 9 at least one other individual image map to said one individual image; and
- 10 D. a second line segment determining module configured to determine a second line segment
 11 along a line defined by the first line segment, the second line segment being such that the
 12 distance between the end points corresponds to the distance between the end points of the
 13 first line segment and positioned along the line such that the centroid of the end points of the
 14 second line segment corresponds to the vertical center of the one image,

15 the quadrangular region corresponding to the two points on the vertical anchor in said one individual
 16 image and the end points of said second line segment.

17 5. A system as defined in claim 4 further including a vertical offset value generating module
 18 configured to generate an offset value for use in the mosaicing step for a rectangular region
 19 generated for said other individual image.

20 6. A system as defined in claim 1 in which the quadrangular region defining module is configured
 21 to define two quadrangular regions on opposing sides of the vertical anchor, each in relation to
 22 mappings of two points on a vertical anchor in at least two other individual images into said one
 23 individual image.

1 7. A system as defined in claim 6 in which the quadrangular region defining module is configured
2 to define a left quadrangular region in relation to

3 (i) mappings of the two points on the vertical anchor in a left individual image into said one
4 individual image, and

5 (ii) two points on the vertical anchor in said one individual image, shifted vertically in relation
6 to a vertical offset between the center of the one individual image and the mapping of the
7 center of the left individual image to the one individual image.

8. A system as defined in claim 6 in which the quadrangular region defining module is configured
to define a right quadrangular region in relation to

(i) mappings of the two points on the vertical anchor in a left individual image into said one
individual image and

(ii) said two points on the vertical anchor in said one individual image.

9. A system of generating a mosaic from a plurality of panoramic images comprising:

A. a motion determining module configured to determine image motion between two panoramic
images;

B. a normalizing module configured to normalize respective columns in said panoramic images
in relation to the ratio of the image motion thereof to the image motion of a selected column,
thereby to generate normalized panoramic images;

C. a strip selection module configured to select strips of the normalized panoramic images; and

8 D. a mosaicing module configured to mosaic the selected strips together.

1 10. A method of generating a mosaic image from a plurality of individual images comprising the
2 steps of:

3 A. a quadrangular region defining step in which, in one individual image a quadrangular region
4 is defined in relation to two points on a vertical anchor in said one individual image and
5 mappings of two points on a vertical anchor in at least one other individual image into said
6 one individual image;

7 B. a warping step in which the quadrangular region is warped to a rectangular region; and

8 C. a mosaicing step in which the quadrangular region is mosaiced to the mosaic image.

9 11. A method as defined in claim 10 in which said two points on said vertical anchor in said one
10 individual image comprise points at which the vertical anchor intersects upper and lower borders of
11 said one individual image.

12 12. A method as defined in claim 10 in which the warping step includes the step of smoothly
13 interpolating between said quadrangular region and said rectangular region.

14 13. A method as defined in claim 10 in which said quadrangular region defining step includes the
15 steps of:

16 A. identifying the two points on the vertical anchor in said one individual image;

- 4 B. identifying two points in said one individual image at which the two points on the vertical
5 anchor in said at least one other individual image map to said one individual image;
- 6 C. determining a line segment between the two points in said one individual image at which the
7 two points on the vertical anchor in said at least one other individual image map to said one
8 individual image; and
- 9 D. determining a second line segment along a line defined by the first line segment, the second
10 line segment being such that the distance between the end points corresponds to the distance
11 between the end points of the first line segment and positioned along the line such that the
12 centroid of the end points of the second line segment corresponds to the vertical center of the
one image,

the quadrangular region corresponding to the two points on the vertical anchor in said one individual image and the end points of said second line segment.

14. A method as defined in claim 13 further including a vertical offset value generating step in which an offset value is generated for use in the mosaicing step for a rectangular region generated for said other individual image.

15. A method as defined in claim 10 in which the quadrangular region defining step includes the step of defining two quadrangular regions on opposing sides of the vertical anchor, each in relation to mappings of two points on a vertical anchor in at least two other individual images into said one individual image.

1 16. A method as defined in claim 15 in which the step of defining two quadrangular regions includes
2 a left quadrangular defining step in which a left quadrangular region is defined in relation to

3 (i) mappings of the two points on the vertical anchor in a left individual image into said one
4 individual image, and

5 (ii) two points on the vertical anchor in said one individual image, shifted vertically in relation
6 to a vertical offset between the center of the one individual image and the mapping of the
7 center of the left individual image to the one individual image.

17. A method as defined in claim 16 in which the step of defining two quadrangular regions includes
a right quadrangular defining step in which a right quadrangular region is defined in relation to

(i) mappings of the two points on the vertical anchor in a left individual image into said one
individual image and

(ii) said two points on the vertical anchor in said one individual image.

18. A method of generating a mosaic from a plurality of panoramic images comprising the steps of:

A. a motion determining step in which image motion is determined between two panoramic
images;

B. a normalizing step in which respective columns in said panoramic images are normalized in
relation to the ratio of the image motion thereof to the image motion of a selected column,
thereby to generate normalized panoramic images;

C. a strip selection step in which strips of the normalized panoramic images are selected; and

8 D. a mosaicing step in which the selected strips are mosaiced together.

1 19. A computer program product for use with a computer to provide a system for generating a
2 mosaic image from a plurality of individual images, the computer program product comprising a
3 machine readable medium having encoded thereon:

4 A. a quadrangular region defining module configured to enable the computer to define in one
5 individual image a quadrangular region in relation to two points on a vertical anchor in said
6 one individual image and mappings of two points on a vertical anchor in at least one other
7 individual image into said one individual image;

8 B. a warping module configured to enable the computer to warp the quadrangular region to a
9 rectangular region; and

10 C. a mosaicing module configured to enable the computer to mosaic the quadrangular region
11 to the mosaic image.

12 20. A system as defined in claim 19 in which said two points on said vertical anchor in said one
13 individual image comprise points at which the vertical anchor intersects upper and lower borders of
14 said one individual image.

15 21. A system as defined in claim 19 in which the warping module is configured to enable the
16 computer to smoothly interpolate between said quadrangular region and said rectangular region.

17 22. A system as defined in claim 19 in which said quadrangular region defining module includes:

- 2 A. a first vertical anchor point identifying module configured to enable the computer to identify
3 two points on the vertical anchor in said one individual image;
- 4 B. a second vertical anchor point identifying module configured to enable the computer to
5 identify two points in said one individual image at which the two points on the vertical
6 anchor in said at least one other individual image map to said one individual image;
- 7 C. a first line segment determining module configured to enable the computer to determine a
8 line segment between the two points in said one individual image at which the two points on
9 the vertical anchor in said at least one other individual image map to said one individual
10 image; and
- 11 D. a second line segment determining module configured to enable the computer to determine
12 a second line segment along a line defined by the first line segment, the second line segment
13 being such that the distance between the end points corresponds to the distance between the
14 end points of the first line segment and positioned along the line such that the centroid of the
15 end points of the second line segment corresponds to the vertical center of the one image,
16 the quadrangular region corresponding to the two points on the vertical anchor in said one individual
17 image and the end points of said second line segment.

1 23. A system as defined in claim 22 further including a vertical offset value generating module
2 configured to enable the computer to generate an offset value for use in the mosaicing step for a
3 rectangular region generated for said other individual image.

1 24. A system as defined in claim 19 in which the quadrangular region defining module is configured
2 to enable the computer to define two quadrangular regions on opposing sides of the vertical anchor,

each in relation to mappings of two points on a vertical anchor in at least two other individual images into said one individual image.

25. A system as defined in claim 24 in which the quadrangular region defining module is configured to enable the computer to define a left quadrangular region in relation to

(i) mappings of the two points on the vertical anchor in a left individual image into said one individual image, and

(ii) two points on the vertical anchor in said one individual image, shifted vertically in relation to a vertical offset between the center of the one individual image and the mapping of the center of the left individual image to the one individual image.

26. A system as defined in claim 25 in which the quadrangular region defining module is configured to enable the computer to define a right quadrangular region in relation to

(i) mappings of the two points on the vertical anchor in a left individual image into said one individual image and

(ii) said two points on the vertical anchor in said one individual image.

27. A system of generating a mosaic from a plurality of panoramic images comprising:

A. a motion determining module configured to enable the computer to determine image motion between two panoramic images;

- 4 B. a normalizing module configured to enable the computer to normalize respective columns
5 in said panoramic images in relation to the ratio of the image motion thereof to the image
6 motion of a selected column, thereby to generate normalized panoramic images;
- 7 C. a strip selection module configured to enable the computer to select strips of the normalized
8 panoramic images; and
- 9 D. a mosaicing module configured to enable the computer to mosaic the selected strips together.